

**EPA Superfund  
Record of Decision:**

**LANGLEY AIR FORCE BASE/NASA LANGLEY  
RESEARCH CENTER  
EPA ID: VA2800005033  
OU 47  
HAMPTON, VA  
01/14/1999**

**RECORD OF DECISION  
LANGLEY AIR FORCE BASE  
OPERABLE UNIT 47 (OT-51)  
DECLARATION**

**SITE NAME AND LOCATION**

Langley Air Force Base  
Operable Unit 47 (Installation Restoration Program [IRP] Site OT-51)  
Hampton, Virginia

**STATEMENT OF BASIS AND PURPOSE**

This Record of Decision (ROD) presents the selected remedial action for IRP Site OT-51, designated Operable Unit (OU)-47, at Langley Air Force Base (AFB) in Hampton, Virginia (the "Site"), chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, 42 U.S.C. §§ 9601-9675 and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations Part 300. This decision is based on the Administrative Record for this Site.

The Virginia Department of Environmental Quality (VDEQ) concurs with the selected remedy.

**DESCRIPTION OF THE SELECTED REMEDY**

OU-47 is part of a comprehensive environmental investigation and cleanup currently being performed at Langley AFB under the CERCLA program. This ROD addresses only OU-47; the other OUs located at Langley AFB are being investigated separately under its Installation Restoration Program and will be addressed in future RODs. Also, this ROD addresses only soil at the OU. The groundwater is being treated as a separate OU and will be addressed on an installation-wide basis.

Langley AFB, the U.S. Environmental Protection Agency, and the VDEQ have determined that No Action is necessary for this site. Risk assessment results indicate that OU-47 soils do not pose an imminent or substantial danger to public health, welfare, or the environment.

## DECLARATION OF STATUTORY DETERMINATIONS

Risk assessment results from the remedial investigation (RI) performed at the OU indicate that No Action is necessary to be protective of human health and the environment.



THOMAS J. KECK  
Lieutenant General, USAF  
Vice Commander, Air Combat Command

4 Jan 99

Date



ABRAHAM FERDAS  
Director  
Hazardous Site Cleanup Division  
U.S. Environmental Protection Agency  
Region III

1/14/99

Date

**RECORD OF DECISION**  
**LANGLEY AIR FORCE BASE**  
**OPERABLE UNIT 47**

**December 1998**

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## **APPENDIX C**

### **Glossary**

## List of Acronyms

AFB	Air Force Base
bgs	below ground surface
BLRA	baseline risk assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	chemicals of potential concern
COPEC	constituents of potential environmental concern
EF	degrees Fahrenheit
DOD	U.S. Department of Defense
EPA	U.S. Environmental Protection Agency
HI	hazard index
IRA	interim removal action
IRP	Installation Restoration Program
msl	mean sea level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
OU	Operable Unit
PCB	polychlorinated biphenyl
ppm	part(s) per million
PRG	preliminary remediation goals
RI	remedial investigation
ROD	Record of Decision
RME	Reasonable Maximum Exposure
SI	site inspection
VDEQ	Virginia Department of Environmental Quality

**RECORD OF DECISION**  
**LANGLEY AIR FORCE BASE**  
**OPERABLE UNIT 47 (OT-51)**

**DECISION SUMMARY**

**I. Site Name, Location, and Description**

Langley Air Force Base (AFB) is an active U.S. Department of Defense (DOD) installation located approximately 180 miles south of Washington, DC, and is part of the Norfolk metropolitan area (Figure 1). The Base sits on a peninsula bounded by the northwest and southwest branches of the Back River, which is a tributary of the Chesapeake Bay. In addition to the 3,152-acre Base installation, Langley AFB supports the 284-acre Bethel Manor Off-Base Housing Area. Langley AFB was proposed to be included on the National Priorities List (NPL) in 1993 and finalized in 1994. This list includes sites where uncontrolled hazardous substance releases may potentially present serious threats to human health and the environment. OU-47 was one of the Installation Restoration Program (IRP) sites investigated under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at Langley AFB and was initially designated IRP Site OT-51.

Operable Unit (OU)-47 is located at the intersection of Nealy Avenue and Burrell Street, in the southern part of the Base (Figures 2 and 3). The abandoned electrical substation that formerly occupied OU-47 was situated in a grassy field north of a boiler station (Building 80), and southeast of a storm sewer lift station and power distribution equipment. Base dormitory housing lies directly across Burrell Street from OU-47 and the Temporary Living Facility is approximately 800 feet southwest of the OU. OU-47 covers approximately 0.08 acre and is approximately 800 feet northwest of the Back River. Current land use at OU-47 is categorized as inactive industrial and is expected to remain industrial in the future. Transformer oil spillage from the electrical substation at OU-47 is believed responsible for polychlorinated biphenyl (PCB) contamination in soil.

## **II. Site History**

This section describes the history of OU-47 and regulatory activities conducted to date.

### **A. OU History**

PCB contamination was detected in Langley AFB storm sewers in May 1990. Transformer oil spillage from the transformers that were formerly located at OU-47 was identified as a potential source. Surface soil and sediment at OU-47 were investigated in 1990 as part of the subsequent study of PCB and chlorinated pesticide contamination in Base storm sewers in the Shellbank Area. Low levels of the PCBs Aroclor 1254 and Aroclor 1260 were detected at concentrations of up to 1.7 parts per million (ppm) and 1 ppm, respectively. The pesticide DDT and one of its metabolites, DDE, were detected at levels of 0.64 ppm and 0.39 ppm, respectively.

### **B. CERCLA Investigations**

Under CERCLA, a site inspection (SI), interim removal action (IRA), and focused remedial investigation (RI) were conducted at OU-47 from 1993 through 1998. The SI was conducted from 1993 to 1995 as part of the SI and screening risk assessment for 33 IRP sites.<sup>1</sup> This investigation was performed to assess the presence or absence of contamination at OU47 resulting from past practices, determine what risks to human health and the environment existed at OU-47, and determine if further action was necessary for OU-47. The SI identified pesticides, PCBs, and metals in surface soil and sediment. The SI report recommended further investigation, to include collection and analysis of groundwater and subsurface soil samples, and the evaluation of risk to human health and the environment.

The IRA was conducted from April to June of 1997.<sup>2</sup> During this activity, the abandoned substation was demolished and removed, soil adjacent to and beneath the substation was removed, storm sewer pipe was excavated and replaced, and confirmation soil samples were collected. Because the soil sample results were below action levels, the excavations were backfilled with clean material. The IRA ensured that all soil previously identified as contaminated with pesticides and PCBs was removed.

A focused RI was conducted from December 1997 through April 1998 to further investigate soil at OU-47, determine groundwater quality, and quantify risk to human health and the environment.<sup>3</sup> Surface and subsurface soil samples were collected, and groundwater samples

were collected from four monitoring wells installed at the OU. An additional sediment sample was collected from the storm sewer junction box west of the removed electrical substation to verify the effectiveness of the ERA. Pesticides and metals were the only constituents detected in soil during the focused RI. The focused RI proved the ERA was effective in reducing contaminant levels to within U.S. Environmental Protection Agency (EPA) acceptable risk range.

These CERCLA investigations have sufficiently determined the nature and extent of contamination and have demonstrated that the OU does not pose an unacceptable risk to human health or the environment.

### **III. Highlights of Community Participation**

In accordance with Sections 113 and 117 of CERCLA, 42 U.S.C. Sections 9613 and 9617, Langley AFB, in conjunction with the EPA and the Virginia Department of Environmental Quality (VDEQ), issued a Proposed Plan on September 13, 1998, presenting the preferred remedial alternative of No Action for OU-47. The Proposed Plan and supporting documentation were made available for review at that time and are among the documents that comprise the CERCLA Administrative Record for the Site.

The Administrative Record is available for review by the public at the following information repositories:

- Hampton Public Library  
Reference Section, Langley AFB Information Repository  
4207 Victoria Boulevard  
Hampton, Virginia 23669  
(757) 727-1154
- Langley AFB  
Administrative Record Room  
ICES/CEVR  
37 Sweeney Boulevard  
Building Number 328  
Langley AFB, Virginia 23665-2107  
(757) 764-1046

An announcement for a public meeting, the comment period, and the availability of the Administrative Record for the remedy for OU-47 was published in the *Daily Press*, a newspaper

of general circulation in Hampton, Virginia, on September 6, 1998 and in the *Flyer*, a Langley Air Force Base newspaper, on September 11 and 18, 1998.

The public comment period for the *Proposed* Plan was from September 13, 1998 to October 12, 1998. A public meeting was held at the Virginia Air and Space Center in Hampton, Virginia on September 24, 1998 to inform the public of the remedial alternatives and to seek public comments. At this meeting, representatives from EPA, VDEQ, and the Air Force were available to answer questions about conditions at the Site and the no action proposal under consideration. Responses to the comments received during this period are included in the Responsiveness Summary section of this ROD.

This ROD presents the selected remedial action for OU-47 determined in accordance with CERCLA, and to the extent practicable, the NCP. All documents considered or relied upon in reaching the remedy selection decision contained in this ROD are included in the Administrative Record for the Site and can be reviewed at the information repositories.

#### **IV. Scope and Role of Operable Unit**

Langley AFB was proposed to be included on the NPL in 1993 and finalized in 1994. This list includes sites where uncontrolled hazardous substance releases may potentially present serious threats to human health and the environment. OU-47 is one of the IRP sites currently being investigated under CERCLA at Langley AFB. Discrete portions of an NPL site are often managed more effectively as Operable Units. Based on preliminary RI results, the Langley AFB Tier I Partnership (described below) decided to separate the soil and groundwater at IRP Site OT51 into separate OUs. This ROD addresses OU-47, which is the IRP Site OT-51 soil OU. The remaining OUs at Langley AFB are currently being independently investigated under CERCLA (Table 1).

Risks to human health and the environment from soil at OU-47 have been evaluated, and this ROD presents the no action proposal recommended based on risk assessment results. The RI report, which includes the baseline risk assessment (BLRA), documents the findings associated with OU-47. On the basis of these findings and the effectiveness of the IRA conducted at OU47, Langley AFB, in consultation with EPA and VDEQ, has determined that the Site does not pose an unacceptable risk to human health and the environment. The risk calculated under the

current and future land use scenarios is below EPA's acceptable risk range.

Langley AFB, with the support of EPA and VDEQ, recommends that No Action is necessary at the Site to protect human health and the environment. Under the No Action alternative, no remedial action will be taken at OU-47. This is the planned response action for this OU. The EPA and VDEQ concur with the No Action alternative proposed by Langley AFB.

This document is the result of a Langley Partnership Team effort. The Langley Partnership, the IRP decision-making body, is composed of representatives from EPA Region 3, VDEQ, the U.S. Air Force Air Combat Command, Langley AFB, the U.S. Army Corps of Engineers, and environmental contractors. Several decisions on how work is to proceed at Langley AFB have been made by the team and have been documented. These signed agreements, or "consensus agreements," are available for review in the Administrative Record.

## **V. Summary of Site Characteristics and Extent of Contamination**

Summarized below are the relevant findings of the work to date with regard to contaminated soil located within the boundaries of the Site.

### **A. Site Characteristics**

#### **1. Geology**

The Site lies within the Atlantic Coastal Plain physiographic province. Ground surface at Langley AFB is predominantly flat lying, with most of the Base lying between 5 and 8 feet above mean sea level (msl). Elevation at OU-47 ranges from about 5 to 6 feet above msl. Drainage in the region is poor, with numerous saltwater and freshwater marshes located along the major streams flowing into the Chesapeake Bay. OU-47 is located approximately 800 feet northwest of the Southwest Branch of the Back River. There are no surface water bodies at OU-47.

The geology of the area around Langley AFB consists of a thin layer of topsoil overlying fill materials of varying thickness placed in developed areas and unconsolidated coastal plain sediments.<sup>4</sup> Topsoil is primarily sandy, silty clays or silty, clayey sands deposited within the flood plains during periods of higher sea level stands or deposited in an estuarine or lagoonal environment. Fill material includes gravel, rubble, and construction debris, and is similar to

native materials. The coastal plain sediments were deposited when the area was a submerged near-shore marine environment.

## **2. Hydrogeology**

Three major groundwater-bearing zones lie beneath Langley AFB. These include the Shallow Water Table Aquifer between 5 to 100 feet below ground surface (bgs), the Upper Artesian Aquifer between 100 and 400 feet bgs, and the Principal Artesian Aquifer between 400 and 700 feet bgs. Recently measured groundwater elevations at OU-47 ranged from 2.2 to 3.4 feet above msl. Even though the groundwater in this area is not used as a source of drinking water, individual homeowners have groundwater wells that have been used for watering lawns and washing cars. However, the Shallow Water Table Aquifer provides an important source "of drinking water farther to the west in King Williams, Charles City, New Kent, James City, and York Counties. In Newport News and Hampton, there are areas where domestic groundwater is obtained from wells that range from 50 to 100 feet in depth. These wells are probably completed in the Shallow Water Table Aquifer, which ranges from 5 to 100 feet below land surface.<sup>1</sup> Groundwater in the shallow water table aquifer beneath the Base is not used as a source of drinking water due to high dissolved solids levels and low aquifer yield. Groundwater flow in this aquifer is slow and flow direction is towards surface water bodies, including the Back River and its tributaries.

## **3. Meteorology**

Langley AFB has a modified continental-type climate with mild winters.<sup>4</sup> During both winter and summer, temperatures are fairly moderate, with winter temperatures ranging from 4 to 70 degrees Fahrenheit (°F), and summer temperatures ranging from lows of 70°F to highs of mid-80 °F. Relative humidity varies between 67 and 76 percent, depending on the month. Prevailing wind direction is from the north during winter and from the south-southwest during the rest of the year. Precipitation ranges from 24 to 57 inches per year, and is evenly distributed throughout the year. Maximum precipitation is in July and August, with minimums in November and April. Average seasonal snowfall in the area is less than 10 inches per year.

## **4. Ecology**

OU-47 presently consists of well-maintained grass lawn. OU-47 is small (0.08 acre) and

contains no surface water bodies; consequently, ecological habitat is limited and of poor quality. However, small mammals and passerine birds may forage for seeds and invertebrates at the OU.

## **5. Soils**

Soil at OU-47 consists of a thin layer of topsoil above a 3.5- to 4-foot thick layer of olive and yellowish brown to dark brown sand and gravel, the uppermost portion of which may be fill material.<sup>3</sup> Underlying the sand and gravel layer is a 4-foot thick layer of olive brown to yellowish brown fine to silty sand with some clay and traces of gravel. The interval from 8 to 16 feet bgs consists of olive gray to dark gray, yellowish brown silty sand with abundant shell fragments ranging in size from fine sand to coarse sand.

### **B. Nature and Extent of Contamination**

The SI conducted at the Site from 1993 to 1995 identified pesticides, PCBs, and metals in surface soil and sediment.<sup>1</sup> Specifically, the pesticides aldrin and dieldrin were detected at levels ranging from non-detect to 0.0323 ppm. (aldrin) and from non-detect to 0.586 ppm (dieldrin); the PCB Aroclor 1260 was detected at levels ranging from non-detect to 18.7 ppm. The metals copper, lead, mercury, nickel, and zinc were detected at levels exceeding background levels at concentrations ranging up to 438 ppm, (copper), 466 ppm (lead), 0. 107 ppm. (mercury), 200 ppm (nickel), and 154 ppm (zinc). The herbicide MCPP was detected at levels ranging from 7.1 to 103 ppm. The SI report recommended further investigation, to include collection and analysis of groundwater and subsurface soil samples and the evaluation of risk to human health and the environment.

The abandoned substation was demolished and removed in the IRA conducted from April to June of 1997.<sup>2</sup> Soil was excavated 10 feet beyond the footprint of the foundation and to a depth of 2 feet, and was characterized and disposed of off site as nonhazardous waste. Confirmation soil samples were collected at the limits of the excavation and at the base of the removed foundation. None of the samples contained chemicals of concern (aldrin, dieldrin, and the PCB Aroclor 1260) above the approved preliminary remediation goals (PRG), and no further excavation was required. In addition to demolition and removal of the foundation and adjacent soil, 147 feet of storm sewer pipe at the Site were excavated and replaced. Confirmation soil samples were

collected along the sidewalls and floor of the ditch to ensure that all soil associated with the sewer line containing chemicals of concern above PRG was removed. All areas excavated during the ERA were backfilled with clean material, graded to original contour, and seeded with grass.

A focused RI was conducted from December 1997 through April 1998 to further investigate soil at OU-47 and to determine groundwater quality.<sup>3</sup> Surface (0 to 0.5 foot bgs) and subsurface (0.5 to 2 feet bgs and 2 to 4 feet bgs) soil samples were collected, and groundwater samples were collected from four monitoring wells installed at the OU (Figure 3). An additional sediment sample was collected from the storm sewer junction box west of the removed electrical substation to verify the effectiveness of the IRA. Pesticides and metals were the only constituents detected in soil during the RI (Figures 4 and 5). Dieldrin results ranged from 0.0065 to 0.11 ppm. Metals, including aluminum, arsenic, beryllium, iron, manganese, and vanadium, were detected at levels ranging from 4,210 to 14,200 ppm (aluminum); 4.6 to 24.4 ppm, (arsenic); 0.46 to 1.3 ppm (beryllium); 10,800 to 33,200 ppm (iron); 51.65 to 193 ppm (manganese); and 20.7 to 1770 ppm (vanadium). The focused RI proved the IRA was effective in reducing contaminant levels to within EPA acceptable risk range.

## **VI. Current and Potential Future Site and Resource Uses**

Current land use at OU-47 is classified as inactive industrial and future land use is expected to be open space/recreational or commercial. There are currently no restrictions regarding use at OU-47, such as fences and signs. Land adjacent to OU-47 is currently residential, open space, and commercial. Future adjacent land use is expected to remain the same.

Groundwater in the shallow water table aquifer at Langley AFB is not currently used as a source of drinking water at or within ½ mile of the Base.<sup>5</sup> Groundwater near the coast is brackish to saline, and therefore not; potable.

## **VII. Summary of Site Risks**

A risk assessment was conducted during the focused RI in accordance with the latest EPA policy on risk assessments.<sup>6</sup> The results are summarized below.

## **A. Human Health Risk Assessment**

The BLRA provides the basis for taking action and indicates the exposure pathways that need to be addressed by the remedial action. It serves as the baseline indicating what risks could exist if no action was taken at OU-47. This section of the ROD reports the results of the BLRA conducted for this OU.

The risk assessment included estimates of the risk posed to human health and the environment assuming an industrial current land-use scenario. The current land-use scenario estimates the level of risk posed by Langley AFB's current use of the land. The current land-use scenario is based on the assumption that the property remains under government control and continues in current or like use. Although OU-47 is located near residences, given its size, location and inactive status, it is unlikely that OU-47 will be used for residential purposes. However, the human health risk assessment also evaluated residential receptors, in addition to the industrial receptors, as a conservative estimate in the unlikely event that OU-47 might be developed for residential use.

The human health risk assessment was based on exposure to soil. Groundwater was also evaluated, but due to the establishment of a separate Basewide groundwater OU, groundwater will not be addressed in this ROD. The ecological risk assessment evaluated risk based on exposure to soil.

Health risks were based on a conservative estimate of the potential carcinogenic risk or the potential to cause other health effects not related to cancer. Carcinogenic risks and noncarcinogenic risks were evaluated. Three factors were considered:

- Nature, and extent of contaminants at OU-47
- Pathways through which human and ecological receptors are or may be exposed to those contaminants at OU-47
- Potential toxic effects of those contaminants.

Cancer risks are expressed as numbers reflecting the increased chance that a person will develop cancer, if he/she is directly exposed (i.e., through working at the OU) to the contaminants found

in the groundwater and soil at the OU over a period of time. For example, EPA's acceptable risk range for Superfund sites is  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ , meaning there is one additional chance in ten thousand ( $1 \times 10^{-4}$ ) to one additional chance in one million ( $1 \times 10^{-6}$ ) that a person will develop cancer if exposed to a Superfund site. The risk associated with developing other health effects is expressed as a hazard index (HI), which is the ratio of the existing level of exposure to contaminants at a site to an acceptable level of exposure. Below an HI of 1, adverse effects are not expected. An HI is also used to evaluate ecological risks.

Concentrations of chemicals detected in the soil during the focused RI were compared to riskbased screening levels and background levels. The chemicals of potential concern (COPC) identified in soil at OU-47 were metals and pesticides. The COPC were then evaluated in the human health risk assessment.

Health risk levels, determined using EPA guidance to ensure that conservative estimates of potential health effects are determined, differ depending on the assumed land use because human exposure differs with land use. A conservative estimate of risk was developed incorporating the potential exposure pathways including direct skin contact with contaminated soil, accidental ingestion of soil, and inhalation of contaminated soil particles. Plausible receptors that may be exposed to soil at the OU and which were evaluated in the risk assessment included a groundskeeper, construction worker, child trespasser, and on-site resident.

The human health risk assessment concluded that the lifetime cancer risks to the receptors from exposure to metals and pesticides in soil at OU-47 are  $4.28 \times 10^{-8}$  for the groundskeeper,  $3.79 \times 10^{-9}$  for the construction worker,  $7.09 \times 10^{-9}$  for the trespassing child, and  $1.51 \times 10^{-6}$  for the onsite resident. These lifetime risks are all within or below EPA's acceptable risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The HI for noncarcinogenic risk due to exposure to metals and pesticides in contaminated soil is 0.07 for the groundskeeper, 0.03 for the construction worker, 0.2 for the trespassing child, 0.5 for an on-site adult resident and 0.8 for the child resident. These values are all below the acceptable level of 1.0, which indicates that adverse noncarcinogenic health effects are unlikely to develop as a result of exposure through any of the exposure pathways. The assumptions and results of the human health risk assessment are included in Tables 2 and 3.

## **B. Ecological Risk Assessment**

The ecological risk assessment at OU-47 was completed in two phases as agreed upon by the Langley Partnership. The first phase was a screening exercise to determine whether chemicals at the Site were sufficiently elevated enough to warrant further consideration as constituents of potential environmental concern (COPEC). The second phase was conducted to evaluate whether the identified COPEC were at sufficiently elevated concentrations to potentially pose a risk to the ecology of OU-47.

Concentrations of 22 metals and 9 organochlorine pesticides, detected in surficial soil at OU-47, were compared to EPA Region III screening levels. The COPEC identified in soil at the Site included 17 inorganic analytes (aluminum, antimony, beryllium, calcium, chromium, copper, iron, lead, magnesium, mercury, nickel, potassium, selenium, silver, sodium, thallium, and vanadium) and 2 pesticides (4,4'-DDE and dieldrin). The COPEC were then evaluated, using food chain uptake models, to estimate ecological risk to soil invertebrates, mammals, and birds. Receptors consisted of the earthworm, deer mouse, American robin, red fox, and red-tailed hawk.

The results of the exposure analysis were carefully evaluated. Nickel was shown to not pose risk. The other 16 metals and 2 pesticides were shown to pose varying degrees of potential risk. Additional considerations were included for various uncertainties (e.g., background concentrations of inorganic analytes, essential nutrient status, and inorganic speciation) within this assessment, as well as site size and habitat quality considerations, to determine whether or not further site cleanup was required. Although the results indicate the potential for risk from COPEC exists, the risk management decision of No Action was recommended based on these uncertainties, as discussed in the RI Report.

## **C. Conclusions**

The overall conclusion of the BLRA is that there is no adverse risk to human health and the environment due to exposure to surface soil or total soil at OU-47. Cancer risks and noncancer risks were estimated for plausible receptors directly or indirectly exposed to the media of interest. The human health risk from exposure to surface soil and total soil calculated under current and future land use scenarios are within EPA's acceptable risk range. Any adverse non-carcinogenic health effects are unlikely to develop from the OU as a result of exposure through any of the exposure pathways. Ecological risk assessment determined that there is minimal risk to

terrestrial receptors at OU-47.

With the support of EPA and VDEQ, Langley AFB has selected No Action as the preferred alternative for soil at OU-47; under this alternative, no remedial action would be undertaken there. The selection of No Action is based on the conclusion, reached by the human health and ecological risk assessments, that the soil at the Site poses no significant risk to potential human or ecological receptors; therefore, No Action would be protective human health and the environment.

Following review and considerations of the information in the Administrative Record, the requirements of CERCLA and the NCP, and the public comments received on the *Proposed Plan*, Langley AFB and EPA, in consultation with VDEQ, have selected the No Action alternative for OU-47.

### **VIII. Significant Changes from Proposed Plan**

The proposed remedial alternative described in the Proposed Plan was No Action. No significant changes to the proposed alternative were made.

### **IX. Responsiveness Summary**

#### **A. Overview**

In a *Proposed Plan* released for public comment on September 13, 1998, Langley AFB, with the support of EPA and VDEQ, identified No Action as the preferred remedial alternative for OU-47.<sup>7</sup> There were no written comments received as a result of the public comment period. There were no written comments submitted during the September 24, 1998 availability session held in Hampton, Virginia. There were three questions presented orally at the availability session concerning OU-47. After evaluating and addressing these comments, Langley AFB, with the support of EPA and VDEQ, has selected No Action as the remedy for OU-47. Comments and the associated responses of Langley AFB, EPA, and VDEQ are described below after a brief discussion of community involvement to date.

#### **B. Community Involvement to Date**

The Langley AFB Partnership established a public comment period from September 13, 1998 to

October 12, 1998 for interested parties to comment on the OU-47 *Proposed Plan*. These and all other documents considered or relied upon during the remedy selection process for OU-47 are included in the Administrative Record, which has been established in two information repositories accessible to the public since the beginning of the public comment period for OU-47. A public meeting was held at the Virginia Air and Space Center, Hampton, Virginia, on September 24, 1998 to present the *Proposed Plan*, answer questions, and accept both oral and written comments on the OU-47 remedial alternative. Two persons attended this session.

This Responsiveness Summary, required by CERCLA, provides a summary of citizens' comments received during the public meeting and the responses of the Air Force, EPA, and VDEQ. Responses for these comments are included in the section below.

### **C. Summary of Comments Received During Public Comment Period and Comment Responses**

Comment #1:

At the site where the electrical substation was removed, was soil removed, too? What material was used to fill in the area, what other things were done, were trees planted?

Response #1:

In addition to removal of the structure, some soil was removed as well. All PCBs are gone but some metals, such as vanadium, remain in very low concentrations. Clean soil was placed in the area as fill after the structure and soil were removed, but no trees or shrubs have been planted at the site.

Comment # 2:

How much contamination was there at Site 51 (former Electrical Substation)?

Response # 2:

The site was relatively small, no bigger than the size of the room in which this meeting is being held. The small size of the site contributed to the "No Action" proposal since the potentially impacted receptors, such as the red-tailed hawk, would not select this area as a place to stay any length of time. The concentration of contamination at the site is in the *Proposed Plan*, and are

provided below:

	Before the Interim Removal Action	After the Interim Removal Action
PCBs:	up to 18.7 ppm	non-detect
copper:	up to 438 ppm	non-detect
lead:	up to 466 ppm	non-detect
mercury:	up to 0.107 ppm	non-detect
nickel:	up to 200 ppm	non-detect
zinc:	up to 154 ppm	non-detect
MCCP (a herbicide):	up to 103ppm	non-detect
Dieldrin :	non-detect	up to 0.11 ppm
aluminum:	non-detect	up to 14,200 ppm
arsenic:	non detect	up to 24.4 ppm
beryllium:	non-detect	up to 1.3 ppm
iron:	non-detect	up to 33,200 ppm
manganese:	non-detect	up to 193 ppm
vanadium:	non-detect	up to 1,770 ppm

Comment # 3:

What is each of your backgrounds and what kind of experience do you have to be in the positions that you are in?

Response # 3:

The EPA representative stated that she has been working with Federal CERCLA sites, including other DOD installations, for 6 years.

The VDEQ representative stated that he had been working with Federal CERCLA sites, including other DOD installations for 6 years.

The Langley representative stated that he had been working in the Air Force environmental program for 12 years.

Each of the representatives stated that they had college degrees in disciplines related to their current positions.

## **X.     References**

<sup>1</sup>*Site Inspection and Screening Risk Assessment Report for 33 Installation Restoration Program Sites, Draft, Langley Air Force Base, Virginia*, Radian Corporation, February 1996.

<sup>2</sup>*Final Report of Field Activity, Installation Restoration Program Site OT-51, Langley Air Force Base, Virginia*, IT Corporation, October 1997.

<sup>3</sup>*Final Focused Remedial Investigation Report for IRP Site OT-51, Langley Air Force Base, Virginia*, IT Corporation, September 1998.

<sup>4</sup>*Langley Air Force Base Basewide Standard Operating Procedures: Background Information Document*, Versar, Inc., January 19, 1996.

<sup>5</sup>*Final Installation Restoration Program (IRP) Conceptual Hydrogeological Model Report for Langley Air Force Base*, Radian International, May 1998.

<sup>6</sup>*Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A), Interim Final*, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC, EPA/540/1-891002, 1989.

<sup>7</sup> *Final Proposed Plan for Remedial Action at Installation Restoration Program Site OT-51, Operable Unit 47, Langley Air Force Base, Virginia*, Langley Air Force Base, September 1998.

## **APPENDIX A**

### **Tables**

**Table 1**

**Summary of Operable Units Under CERCLA Investigation  
Langley Air Force Base, Virginia**

**Page 1 of 3**

<b>OU Name/IRP Site Name</b>	<b>Findings</b>	<b>Current Status</b>
OU-21/LF-01 Former Landfill, End of 08/26 Runway	Contaminants of potential Concern (COPCs) - pesticides and metals in the groundwater and soil.	In the remedial investigation (RI) phase. A draft RI report has been submitted and reviewed. A separate basewide ecological risk assessment is currently underway.
OU-22/WP-02 Former Waste Water Treatment Plant, Bldg 724	COPCs - pesticides and metals in the groundwater and soil.	In the RI phase. A draft RI report will be submitted by mid- 1999.
OU-23/LF-05 Former Landfill in the Shellbank Area	COPCs - pesticides, volatile organic compounds ( VOCs), and metals in the groundwater; pesticides and metals in the surface water; and semivolatile organic compounds (SVOCs) and metals in the soil.	In the RI phase. A draft RI report has been submitted and reviewed. A separate basewide ecological risk assessment is currently underway.
OU-24/OT-06 Former Entomology Site, Shellbank Area	COPCs - pesticides, VOCs, SVOC, and some metals in the groundwater, SVOCs, pesticides and some metals in the soil.	In the RI phase. A draft RI report has been submitted and reviewed. A separate basewide ecological risk assessment is currently underway.
OU-25/LF-07 Former Landfill, Shellbank Area	COPCs - pesticides and some metals in the groundwater, dieldrin in the soil.	In the RI phase. A draft RI report has been submitted and reviewed. A separate basewide ecological risk assessment is currently underway.
OU-26/WP-08 Former Waste Water Treatment Plant, Lighter Than Air (LTA) Area	COPCs - some pesticides and metals in the groundwater; dieldrin in the soil.	In the RI phase. A draft RI report has been submitted and reviewed.
OU-28/LF-10 Former Landfill, Golf Course	COPCs - VOCs, metals and some pesticides in the groundwater; VOCs and polychlorinated biphenyls (PCBs) in surface water; some metals in the soil.	In the RI phase. A draft RI report has been submitted and reviewed. A separate basewide ecological risk assessment is currently underway.
OU-29, LF-11 Former Landfill, Tabbs Creek Area	COPCs - VOCs, pesticides, metals and PCBs in the groundwater, some metals in the surface water, SVOCs, metals, and PCBs in the soil.	In the RI phase. A draft RI report has been submitted and reviewed. A separate basewide ecological risk assessment is currently underway.
OU-30/LF-12 Former Landfill, Munitions Storage area, Northwest Area of Base	COPCs - VOCs and metals in the groundwater; metals and 2,4 DB in the surface water; SVOCs and nickel in the soil.	In the RI phase. A draft RI report has been submitted and reviewed. A separate basewide ecological risk assessment is currently underway.

**Table 1**

**Summary of Operable Units Under CERCLA Investigation  
Langley Air Force Base, Virginia**

**Page 2 of 3**

<b>OU Name/IRP Site Name</b>	<b>Findings</b>	<b>Current Status</b>
OU-31/LF-13 Former Landfill Munitions Storage Area, Northwest Area of Base	COPCs - Aldrin, alpha-BHC and some metals in the groundwater; VOCs, SVOCs, metals and PCBs in the surface water.	In the RI phase. A draft RI report has been submitted and reviewed. A separate basewide ecological risk assessment is currently underway.
OU-32/WP-14 Former Chemical Leach Pit, Firing-In Abutment, Building 1303	COPCs - pesticides, SVOCs, and some metals in the groundwater; pesticides and dieldrin in the soil.	In the R1 phase. A draft RI report has been submitted and reviewed. A separate basewide ecological risk assessment is currently underway.
OU-33/LF-15 Former Landfill, Willoughby Point	COPCs - VOCs, SVOCs, pesticides and metals in the groundwater; pesticides and metals in the surface water.	In the RI phase. A draft RI report has been submitted and reviewed. A separate basewide ecological risk assessment is currently underway.
OU-34/LF-17 Former Landfill, LTA Area	COPCs - VOCs, pesticides and some metals in the groundwater; dieldrin and some metals (mainly lead) in the soil.	In the RI phase/ A draft AI report will be submitted by mid-1999.
OU-35/LF-18 Former Landfill, Northwest corner of Base	COPCs - pesticides in the groundwater; pesticides and metals in the surface water; SVOCs and manganese in the surface soil; delta-BHC, and metals in the sediment.	In the RI phase. A draft RI report has been submitted and reviewed. A separate basewide ecological risk assessment is currently underway.
OU-37/LF-22 Former Landfill, Willoughby Point	COPCs - pesticides and metals in the groundwater; alpha-BHC, delta-BHC and metals in the surface water.	In the RI phase. A draft RI report has been submitted and reviewed. A separate basewide ecological risk assessment is currently underway.
OU-40/OT-25 Old Entomology Building and Former Storage Area, Bldg 965	COPCs - pesticides in the groundwater and soil.	In the RI phase. A separate basewide ecological risk assessment is currently underway.
OU-42/OT-38A and B Four Waste Oil and Trash Burn Areas, Basewide	Risk assessments showed no significant risk to human health or the environment from soils	In the Record of Decision (ROD) phase for soils. Groundwater ROD will follow at a later date. The final RI report was submitted in September 1996.
OU-44/FT-41 Former Fire Training Area, Firing-In Abutment, Bldg 1303	COPC& - VOCs, pesticides, dioxins, and some metals in the groundwater; SVOCs, dioxins and some metals in the surface water.	In the RI phase. A draft RI report has been submitted and reviewed. A separate basewide ecological risk assessment is currently underway.
OU-47/OT-51 Former Electrical Substation; Shellbank Area, Bldg 82	COPCs - pesticides, PCBs and lead in the soil.	In the ROD phase for soil. The RI report and proposed plan (PP) have been finalized. The ROD is due to be finalized by the end of 1998.

**Table 1**

**Summary of Operable Units Under CERCLA Investigation  
Langley Airforce Base, Virginia**

Page 3 of 3

<b>OU Name/IRP Site Name</b>	<b>Findings</b>	<b>Current Status</b>
OU-48/OT-55 Civil Engineering Yard, Underground Petroleum Contamination	COPCs - pesticides and dieldrin in the groundwater; pesticides and PCBs in the soil.	In the RI phase. A draft RI report is due to be submitted by mid-1999.
OU-49/OT-56 Silver Contamination in Storm Sewers, Basewide	COPCs - metals and VOCs in surface water and metals, SVOCs and pesticides in sediment.	In the feasibility study (FS) phase. The FS is due to be finalized by mid-1999.
OU-50/SS-61 Old Civil Engineering Paint Shop/Marina	COPCs - VOCs in the groundwater and soil.	In the PP phase. The PP is due to be finalized by the end of 1998.
OU-51/SS-63 Back River Sediments	COPCs - pesticides, metals and PCTs in the sediment.	In the preliminary assessment/site inspection (PA/SI) phase. The draft PA/SI report is due to be submitted by the end of 1998.
OU-52/OT-64 Groundwater Contamination, Basewide	COPCs - pesticides and metals in the groundwater.	In the scoping phase. The long-term monitoring project is due to be awarded by mid-1999.

Table 2

**Variables Used to Estimate Potential Chemical Intakes  
and Contact Rates for Receptors at IRP Site OT-51 (OU-47)  
Langley Air Force Base, Virginia**

(Page 1 of 10)

Pathway Variable	Groundskeeper	Construction Worker	Child Trespasser	On-Site Resident
<b>Inhalation of VOCs and Resuspended Dust from Soil</b>				
IR <sub>s</sub> (m <sup>3</sup> /hour)	2.5 <sup>a</sup>	2.5 <sup>a</sup>	NA	NA
FI <sub>s</sub> (unitless)	1 <sup>b</sup>	1 <sup>b</sup>	NA	NA
ET <sub>s</sub> (hours/day)	1 <sup>b</sup>	8 <sup>b</sup>	NA	NA
EF (days/year)	50 <sup>b</sup>	20 <sup>b</sup>	NA	NA
ED (years)	RME: 25 <sup>b</sup> CT: 9 <sup>b</sup>	1 <sup>b</sup>	NA	NA
BW (kg)	70 <sup>a</sup>	70 <sup>a</sup>	NA	NA
AT Noncancer (days) <sup>c</sup>	RME: 9,125 CT: 3,285	365	NA	NA
AT Cancer (days) <sup>c</sup>	25,550	25,550	NA	NA
<b>Inhalation of VOCs from Groundwater (Age Adjusted Resident - Cancer Evaluation)</b>				
InhF <sub>gw</sub> (m <sup>3</sup> -year/kg-day)	NA	NA	NA	RME: 0.09 <sup>a</sup> CT: 0.02 <sup>a</sup>
FI <sub>g</sub> (unitless)	NA	NA	NA	1 <sup>b</sup>
ET <sub>g</sub> (hours/day)	NA	NA	NA	RME: 0.33 <sup>b</sup> CT: 0.17 <sup>b</sup>
EF (days/year)	NA	NA	NA	RME: 350 <sup>a</sup> CT: 234 <sup>a</sup>
AT Cancer (days) <sup>c</sup>	NA	NA	NA	25,550
<b>Inhalation of VOCs from Groundwater (Noncancer Evaluation)</b>				

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Table 2

**Variables Used to Estimate Potential Chemical Intakes  
and Contact Rates for Receptors at IRP Site OT-51 (OU-47)  
Langley Air Force Base, Virginia**

(Page 2 of 10)

Pathway Variable	Groundskeeper	Construction Worker	Child Trespasser	On-Site Resident
IR <sub>a</sub> (m <sup>3</sup> /hr)	NA	NA	NA	Adult: 0.83 <sup>a</sup>
FI <sub>a</sub> (unitless)	NA	NA	NA	1 <sup>b</sup>
ET <sub>a</sub> (hours)	NA	NA	NA	Adult: 0.33 <sup>d</sup>
EF (days/year)	NA	NA	NA	RME: 350 <sup>a</sup> CT: 234 <sup>c</sup>
ED (years)	NA	NA	NA	Adult RME: 30 <sup>a</sup> Adult CT: 9 <sup>c</sup>
BW (kg)	NA	NA	NA	Adult : 70 <sup>a</sup>
AT Non-Cancer (days) <sup>d</sup>	NA	NA	NA	Adult RME: 10,950 Adult CT: 3,285
<b>Incidental Ingestion of COPC in Soil (Non-Residential)</b>				
IR <sub>a</sub> (mg/day)	50 <sup>a</sup>	480 <sup>c</sup>	RME: 100 <sup>a</sup> CT: 50 <sup>b</sup>	NA
FI <sub>a</sub> (unitless)	0.125 <sup>b</sup>	1 <sup>b</sup>	0.625 <sup>b</sup>	NA
EF (days/year)	50 <sup>b</sup>	20 <sup>b</sup>	50 <sup>b</sup>	NA
ED (years)	RME: 25 <sup>a</sup> CT: 9 <sup>c</sup>	1 <sup>b</sup>	RME: 12 <sup>b</sup> CT: 9 <sup>c</sup>	NA
BW (kg)	70 <sup>a</sup>	70 <sup>a</sup>	43 <sup>b</sup>	NA
AT Noncancer (days) <sup>d</sup>	RME: 9,125 CT: 3,285	365	RME: 4,380 CT: 3,285	NA
AT Cancer (days) <sup>e</sup>	25,550	25,550	25,550	NA

**Table 2**  
**Variables Used to Estimate Potential Chemical Intakes**  
**and Contact Rates for Receptors at IRR Site OT-51 (OU-47)**  
**Langley Air Force Base, Virginia**

(Page 3 of 10)

Pathway Variable	Groundskeeper	Construction Worker	Child Trespasser	On-Site Resident
<b>Incidental Ingestion of COPC in Soil (Age-Adjusted Residential Cancer Evaluation)</b>				
$\text{IngF}_{\text{soil}}$ (mg-yr/kg-day)	NA	NA	NA	RME: 114 <sup>d</sup> CT: 17 <sup>b</sup>
$\text{FI}_s$ (unitless)	NA	NA	NA	1 <sup>b</sup>
EF (days/year)	NA	NA	NA	RME: 350 <sup>d</sup> CT: 234 <sup>c</sup>
AT Cancer (days) <sup>a</sup>	NA	NA	NA	25,550
<b>Incidental Ingestion of COPC in Soil (Residential Non-Cancer Evaluation)</b>				
$\text{IR}_s$ (mg/d)	NA	NA	NA	Adult RME: 100 <sup>a</sup> Adult CT: 50 <sup>c</sup> Child RME: 200 <sup>a</sup> Child CT: 100 <sup>c</sup>
$\text{FI}_s$ (unitless)	NA	NA	NA	1 <sup>b</sup>
EF (days/year)	NA	NA	NA	RME: 350 <sup>d</sup> CT: 234 <sup>c</sup>
ED (years)	NA	NA	NA	Adult RME: 30 <sup>a</sup> Adult CT: 9 <sup>c</sup> Child RME: 6 <sup>a</sup> Child CT: 1.8 <sup>c</sup>
BW (kg)	NA	NA	NA	Adult: 70 <sup>a</sup> Child: 15 <sup>c</sup>

Table 2

**Variables Used to Estimate Potential Chemical Intakes  
and Contact Rates for Receptors at IRP Site OT-51 (OU-47)  
Langley Air Force Base, Virginia**

(Page 4 of 10)

Pathway Variable	Groundskeeper	Construction Worker	Child Trespasser	On-Site Resident
AT Noncancer (days) <sup>a</sup>	NA	NA	NA	Adult RME: 10,950 Adult CT: 3,285 Child RME: 2,190 Child CT: 657
<b>Ingestion of COPC in Drinking Water (Age Adjusted Resident - Cancer Evaluation)</b>				
IRF <sub>Wd</sub> (L-year/kg-day)	NA	NA	NA	RME: 1.09 <sup>b</sup> CT: 0.26 <sup>b</sup>
FL <sub>w</sub> (unitless)	NA	NA	NA	1 <sup>b</sup>
EF (days/year)	NA	NA	NA	RME: 350 <sup>b</sup> CT: 234 <sup>b</sup>
AT Cancer (days) <sup>a</sup>	NA	NA	NA	25,550
<b>Ingestion of COPC in Drinking Water (Residential Noncancer)</b>				
IR <sub>w</sub> (L-day)	NA	NA	NA	Adult RME: 2 <sup>b</sup> Adult CT: 1.4 <sup>b</sup> Child RME: 1 <sup>b</sup> Child CT: 1 <sup>b</sup>
FL <sub>w</sub> (unitless)	NA	NA	NA	1 <sup>b</sup>
EF (days/year)	NA	NA	NA	RME: 350 <sup>b</sup> CT: 234 <sup>b</sup>
ED (years)	NA	NA	NA	Adult RME: 30 <sup>a</sup> Adult CT: 9 <sup>a</sup> Child RME: 6 <sup>a</sup> Child CT: 1.8 <sup>a</sup>

**Table 2**

**Variables Used to Estimate Potential Chemical Intakes  
and contact Rates for Receptors at IRP Site OT-51 (OU-47)  
Langley Air Force Base, Virginia**

(Page 5 of 10)

Pathway Variable	Groundskeeper	Construction Worker	Child Trespasser	On-Site Resident
BW (kg)	NA	NA	NA	Adult : 70 <sup>g</sup> Child: 15
AT Noncancer (days) <sup>d</sup>	NA	NA	NA	Adult RME: 10,950 Adult CT: 3,285 Child RME: 2,190 Child CT: 657
<b>Ingestion of COPC in Drinking Water (Non-residential Evaluation.)</b>				
IR <sub>w</sub> (L-day)	1 <sup>a</sup>	1 <sup>e</sup>	NA	NA
FI <sub>w</sub> (unitless)	1 <sup>b</sup>	1 <sup>b</sup>	NA	NA
EF (days/year)	50 <sup>b</sup>	20 <sup>b</sup>	NA	NA
ED (years)	RME: 25 <sup>a</sup> CT: 9 <sup>c</sup>	1 <sup>b</sup>	NA	NA
BW (kg)	70 <sup>a</sup>	70 <sup>a</sup>	NA	NA
At Noncancer (days) <sup>d</sup>	RME: 9,125 CT:3,285	365	NA	NA
At Cancer (days) <sup>f</sup>	25,550	25,550	NA	NA
<b>Dermal Uptake of COPC from Soil (Eq.,)</b>				
SA (cm <sup>2</sup> )	2000 <sup>g</sup>	2000 <sup>g</sup>	3275 <sup>g</sup>	NA
FI <sub>d</sub> (unitless)	1 <sup>b</sup>	1 <sup>b</sup>	0.625 <sup>b</sup>	NA
EF (days/year)	50 <sup>b</sup>	20 <sup>b</sup>	50 <sup>b</sup>	NA
ED (years)	RME: 25 <sup>a</sup> CT: 9 <sup>c</sup>	1 <sup>b</sup>	RME: 12 <sup>b</sup> CT: 9 <sup>c</sup>	NA

**Table 2**  
**Variables Used to Estimate Potential Chemical Intakes**  
**and contact Rates for Receptors at IRP Site OT-51 (OU-47)**  
**Langley Air Force Base, Virginia**

(Page 6 of 10)

Pathway Variable	Groundskeeper	Construction Worker	Child Trespasser	On-Site Resident
BW (kg)	70 <sup>a</sup>	70 <sup>a</sup>	43 <sup>b</sup>	NA
AT Noncancer (days) <sup>d</sup>	RME: 9,125 CT: 3,285	365	Adult RME: 4,380 Adult CT: 3,285	NA
AT Cancer (days) <sup>e</sup>	25,550	25,550	25,250	NA
AF (mg/cm <sup>2</sup> )	0.2 <sup>h</sup>	0.2 <sup>h</sup>	0.2 <sup>h</sup>	NA
ABS (unitless)	csv	csv	csv	NA
<b>Dermal Uptake of COPC from Soil (Age Adjusted residential Evaluation)(Eq.,,)</b>				
SFS <sub>adj</sub> (cm <sup>2</sup> -year/kg-day)	NA	NA	NA	RME: 2700 <sup>b</sup> CT: 800 <sup>b</sup>
Fl <sub>d</sub> (unitless)	NA	NA	NA	1 <sup>b</sup>
EF (days/year)	NA	NA	NA	RME: 350 <sup>b</sup> CT: 234 <sup>c</sup>
AT Cancer (days) <sup>e</sup>	NA	NA	NA	25,550
AF (mg/cm <sup>2</sup> )	NA	NA	NA	0.2 <sup>h</sup>
ABS (unitless)	NA	NA	NA	csv
<b>Dermal Uptake of COPC from Soil (Residential Noncancer)</b>				
SA (cm <sup>2</sup> )	NA	NA	NA	Adult : 5000 <sup>g</sup> Child: 2400 <sup>g</sup>
Fl <sub>d</sub> (unitless)	NA	NA	NA	1 <sup>b</sup>
EF (days/year)	NA	NA	NA	RME: 350 <sup>a</sup> CT: 234 <sup>c</sup>

**Table 2**  
**Variables Used to Estimate Potential Chemical Intakes**  
**and contact Rates for Receptors at IRP Site OT-51 (OU-47)**  
**Langley Air Force Base, Virginia**

(Page 7 of 10)

Pathway Variable	Groundskeeper	Construction Worker	Child Trespasser	On-Site Resident
ED (years)	NA	NA	NA	Adult RME: 30 <sup>a</sup> Adult CT: 9 <sup>e</sup> Child RME: 6 <sup>f</sup> Child CT: 1.8 <sup>g</sup>
BW (kg)	NA	NA	NA	Adult : 70 <sup>a</sup> Adult : 15 <sup>f</sup>
AT Noncancer (days) <sup>d</sup>	NA	NA	NA	Adult RME: 10,950 Adult CT: 3,285 Child RME: 2,190 Child CT: 657
AF (mg/cm <sup>2</sup> )	NA	NA	NA	0.2 <sup>h</sup>
ABS (unitless)	CSV	CSV	CSV	CSV
<b>Dermal Uptake of COPC from Soil (Age Adjusted residential - Cancer Evaluation)(Eq.,,,)</b>				
SFW <sub>adj</sub> (cm <sup>2</sup> -year/kg-day)	NA	NA	NA	RME: 10,000 <sup>b</sup> CT: 2,900 <sup>b</sup>
Fl <sub>d</sub> (unitless)	NA	NA	NA	1 <sup>b</sup>
EF (days/year)	NA	NA	NA	RME: 350 <sup>b</sup> CT: 234 <sup>c</sup>
AT Cancer (days) <sup>e</sup>	NA	NA	NA	25,550
PC (cm/hour)	NA	NA	NA	CSV
tau (hours)	NA	NA	NA	CSV
ET <sub>d</sub> (hours/day)	NA	NA	NA	RME:0.33 <sup>i</sup> CT:0.17 <sup>g</sup>

**Table 2**  
**Variables Used to Estimate Potential Chemical Intakes**  
**and contact Rates for Receptors at IRP Site OT-51 (OU-47)**  
**Langley Air Force Base, Virginia**

(Page 8 of 10)

Pathway Variable	Groundskeeper	Construction Worker	Child Trespasser	On-Site Resident
<b>Dermal Uptake of COPC from Groundwater (Residential Noncancer Evaluation)</b>				
SA (cm <sup>2</sup> )	NA	NA	NA	Adult : 20,000 <sup>g</sup> Child: 7,300 <sup>g</sup>
Fl <sub>d</sub> (unitless)	NA	NA	NA	1 <sup>b</sup>
EF (days/year)	NA	NA	NA	RME: 350 <sup>a</sup> CT: 234 <sup>c</sup>
ED (years)	NA	NA	NA	Adult RME: 30 <sup>a</sup> Adult CT: 9 <sup>c</sup> Child RME: 6 <sup>a</sup> Child CT: 1.8 <sup>b</sup>
BW (kg)	NA	NA	NA	Adult :70 <sup>a</sup> Child: 15
AT Noncancer (days) <sup>f</sup>	NA	NA	NA	Adult RME: 10,950 Adult CT: 3,285 Child RME: 2,190 Child CT: 657
tau (hours)	NA	NA	NA	csv
PC (cm/hour)	NA	NA	NA	NA
ET <sub>d</sub> (hours/day)	NA	NA	NA	RME:0.33 <sup>i</sup> CT:0.17 <sup>g</sup>
<b>Dermal Uptake of COPC from Groundwater (Non Residential)</b>				
SA (cm <sup>2</sup> )	4100 <sup>g</sup>	4100 <sup>g</sup>	NA	NA
Fl <sub>d</sub> (unitless)	1 <sup>b</sup>	1 <sup>b</sup>	NA	NA

Table 2

**Variables Used to Estimate Potential Chemical Intakes  
and Contact Rates for Receptors at IRP Site OT-51 (OU-47)  
Langley Air Force Base, Virginia**

(Page 9 of 10)

Pathway Variable	Groundskeeper	Construction Worker	Child Trespasser	On-Site Resident
EF (days/year)	50*	20*	NA	NA
ED (years)	RME: 25 <sup>b</sup> CT: 6 <sup>c</sup>	1*	NA	NA
BW (kg)	70*	70*	NA	NA
AT Noncancer (days) <sup>d</sup>	RME: 9,125 CT: 3,285	365	NA	NA
AT Cancer (days) <sup>e</sup>	25,550	25,550	NA	NA
PC (cm/hour)	csv	csv	NA	NA
Iau (hours)	csv	csv	NA	NA
ET <sub>s</sub> (hours/day)	1*	1*	NA	NA

ABS = Absorption factor.

csv = Chemical-Specific Value.

EF = Exposure frequency.

IngF<sub>adj</sub> = Age-adjusted ingestion factor.IR<sub>s</sub> = Ingestion rate.

RME = Reasonable Maximum Exposure.

SFS<sub>adj</sub> = Age-adjusted soil skin contact factor.

VOC = Volatile organic compound.

AT = Averaging time.

CT = Central tendency.

ET = Exposure time.

IngF<sub>adj</sub> = Age-adjusted inhalation factor.

NA = Not Applicable.

SA = Surface area of the skin available for contact with site medium.

SFW<sub>adj</sub> = Age-adjusted water skin contact factor.

BW = Body weight.

ED = Exposure duration.

FI = Fraction of exposure attributed to site medium.

IR<sub>s</sub> = Inhalation rate.

PC = Permeability coefficient.

\*U.S. Environmental Protection Agency (EPA), 1991, Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance, Standard Default Exposure Factors, Interim Final, Office of Solid Waste and Emergency Response, OSWER Directive: 9285.6-03.

<sup>b</sup>Assumed; see Final Focused Remedial Investigation Report for IRP Site OT-51, Langley Air Force Base, Virginia, (IT, 1998).

**Table 2**

**Variables Used to Estimate Potential Chemical Intakes  
and Contact Rates for Receptors at IRP Site OT-51 (OU-47)  
Langley Air Force Base, Virginia**

(Page 10 of 10)

<sup>c</sup>U.S. Environmental Protection Agency (EPA), 1993, *Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure*, Preliminary Review Draft (5/5M).

<sup>d</sup>Calculated as the product of ED (years) x 365 days/year.

<sup>e</sup>Calculated as the product of 70 years (assumed human lifetime) (EPA, 1989, *Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual [Part A]*, Interim Final, Office of Emergency and Remedial Response, Washington, DC, EPA/540/1-8/002, 1989) x 365 days/year).

<sup>f</sup>U.S. Environmental Protection Agency (EPA), 1995a, Letter from W. Arguta, EPA Region III, to W. E. Budrus, U.S. Army Engineer District, Huntington, dated October 18.

<sup>g</sup>U. S. Environmental Protection Agency (EPA), 1992, *Dermal Exposure Assessment Principles and Applications*, Interim Report, Office of Research and Development, Washington, DC, EPA/600/8-91 /011 B, including Supplemental Guidance dated August 18, 1992.

<sup>h</sup>U.S. Environmental Protection Agency (EPA), 1996, *Exposure Factors Handbook*, Volume I of III - General Factors, Office of Health and Environmental Assessment, Washington, DC, EPA/600/P-95/002 Ba. 89/043.

<sup>i</sup>U.S. Environmental Protection Agency (EPA), 1997, *Risk-Based Concentration Table*, 22 October, EPA Region 111, Philadelphia, PA, on-line.

Table 3

**Summary of Site-Related RME Cancer Risk and Noncancer Hazard for IRP Site OT-51 (OU-47)  
Langley Air Force Base, Virginia**

Receptors	Surface Soil	Total Soil	Groundwater Site-Related	Total ILCR
	Site-Related ILCR	Site-Related ILCR	ILCR	All Pathways
Groundskeeper	1.01E-08	NA	8.24E-05	8.24E-05
Construction Worker	NA	3.79E-09	1.32E-06	1.32E-06
Child Trespasser	7.09E-08	NA	NA	7.09E-08
Age-Adjusted Resident	NA	1.51E-06	1.78E-03	1.78E-03

Receptors	Surface Soil	Total Soil	Groundwater Site-Related	Total HI
	Site-Related HI	Site-Related HI	HI	All Pathways
Groundskeeper	1.12E-02	NA	6.55E-01	6.66E-01
Construction Worker	NA	3.50E-02	2.62E-01	2.97E-01
Child Trespasser	1.56E-01	NA	NA	1.56E-01
On-Site Adult Resident	NA	5.04E-01	9.11E+00	9.61E+00
On-Site Child Resident	NA	1.79E+00	2.11E+01	2.29E+01

HI = Hazard Index

ILCR = Incremental lifetime cancer risk

NA = Not Applicable

RME = Reasonable Maximum Exposure

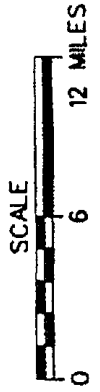
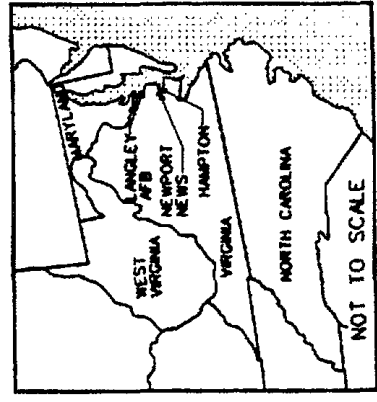
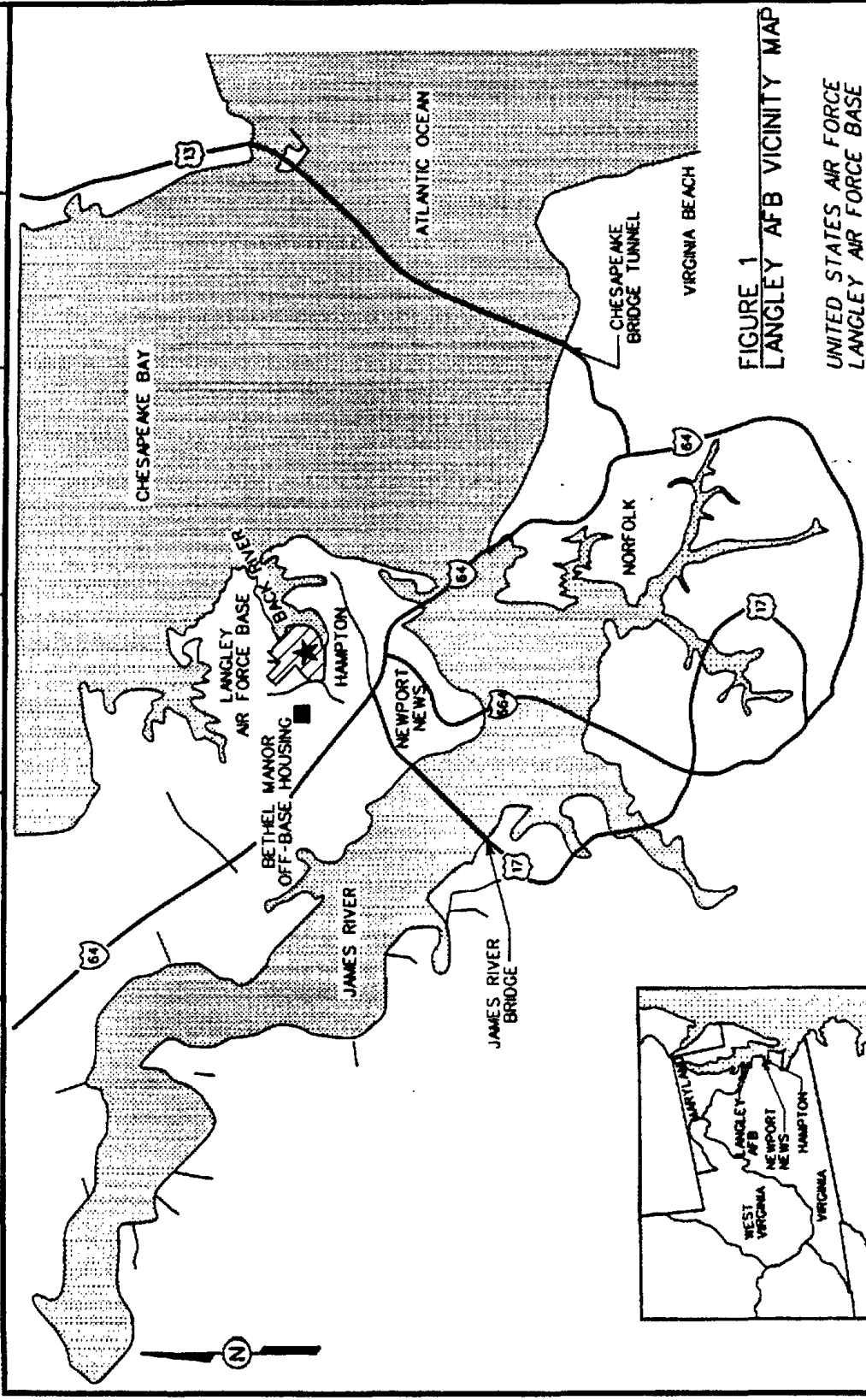
## **APPENDIX B**

### **Figures**

15:16:09	15:16:09	STARTING DATE: 6/3/96	DATE LAST REV: 25 NOV 98	DRAFT, CHCK. BY: C. TUMLIN	INITIATOR: K. Thorbjornsen	DWG. NO.: 774309ES. 030
		DRAWN BY: D. BILLINGSLEY	DRAWN BY:	CHALL. ENCR. CHCK. BY: K. Thorbjornsen	PROJ. MGR: D. BOWHOL	PROJ. NO.: 774309

DHALL

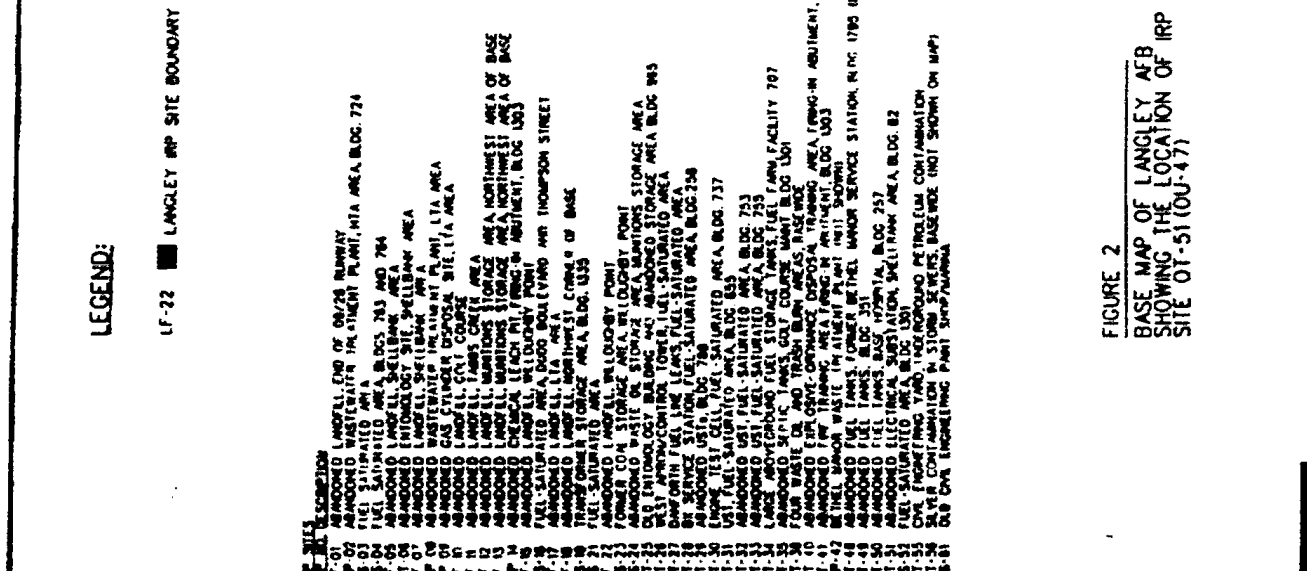
C:\IT\DS\NCI\774309ES.030



**FIGURE 1**  
**LANGLEY AFB VICINITY MAP**

UNITED STATES AIR FORCE  
LANGLEY AIR FORCE BASE  
HAMPTON, VIRGINIA



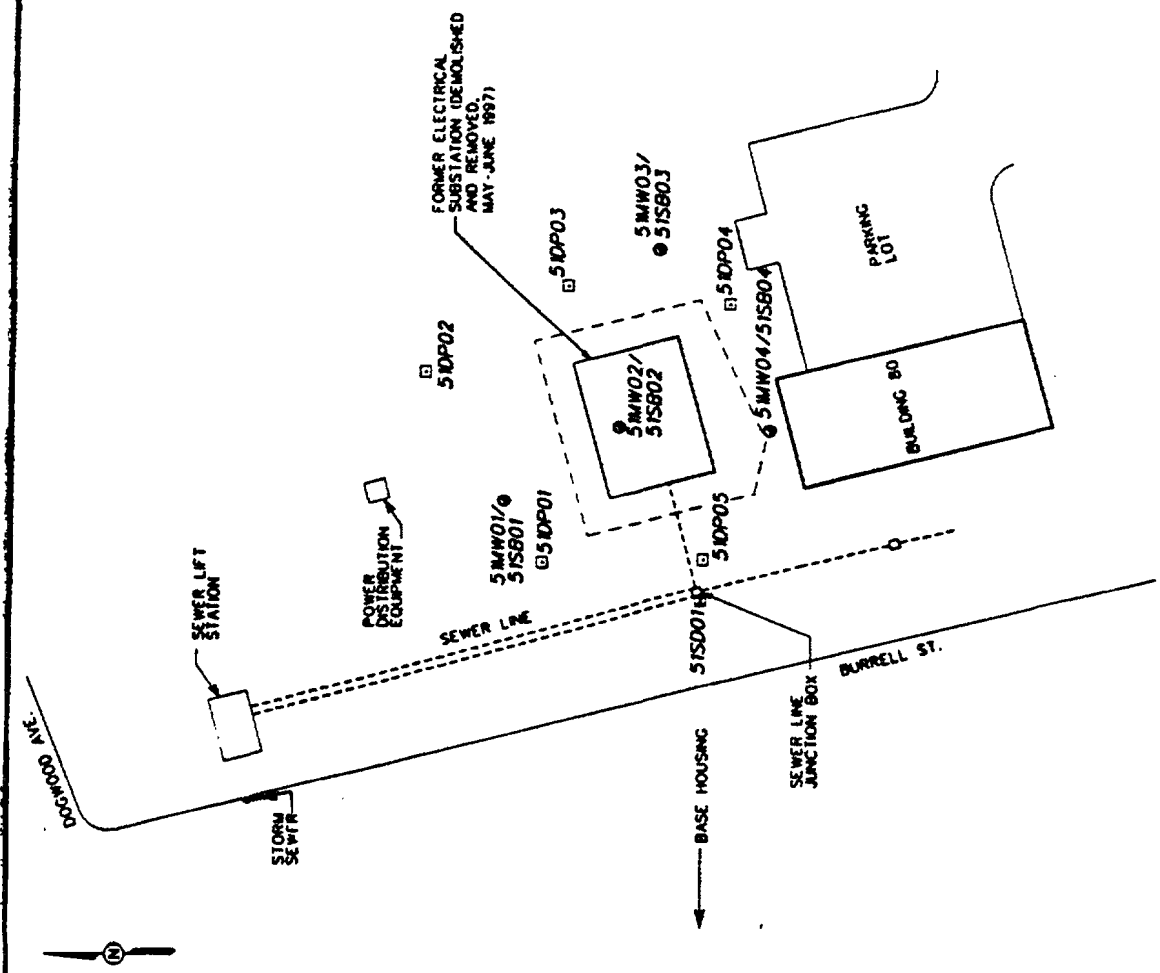


**FIGURE 2**  
**BASE MAP OF LANGLEY AFB**  
**SHOWING THE LOCATION OF IRP**  
**SITE OT-51 (OU-47)**

SCALE:

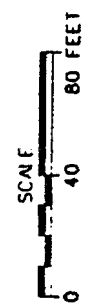


0 2000 4000 FEET



**LEGEND:**

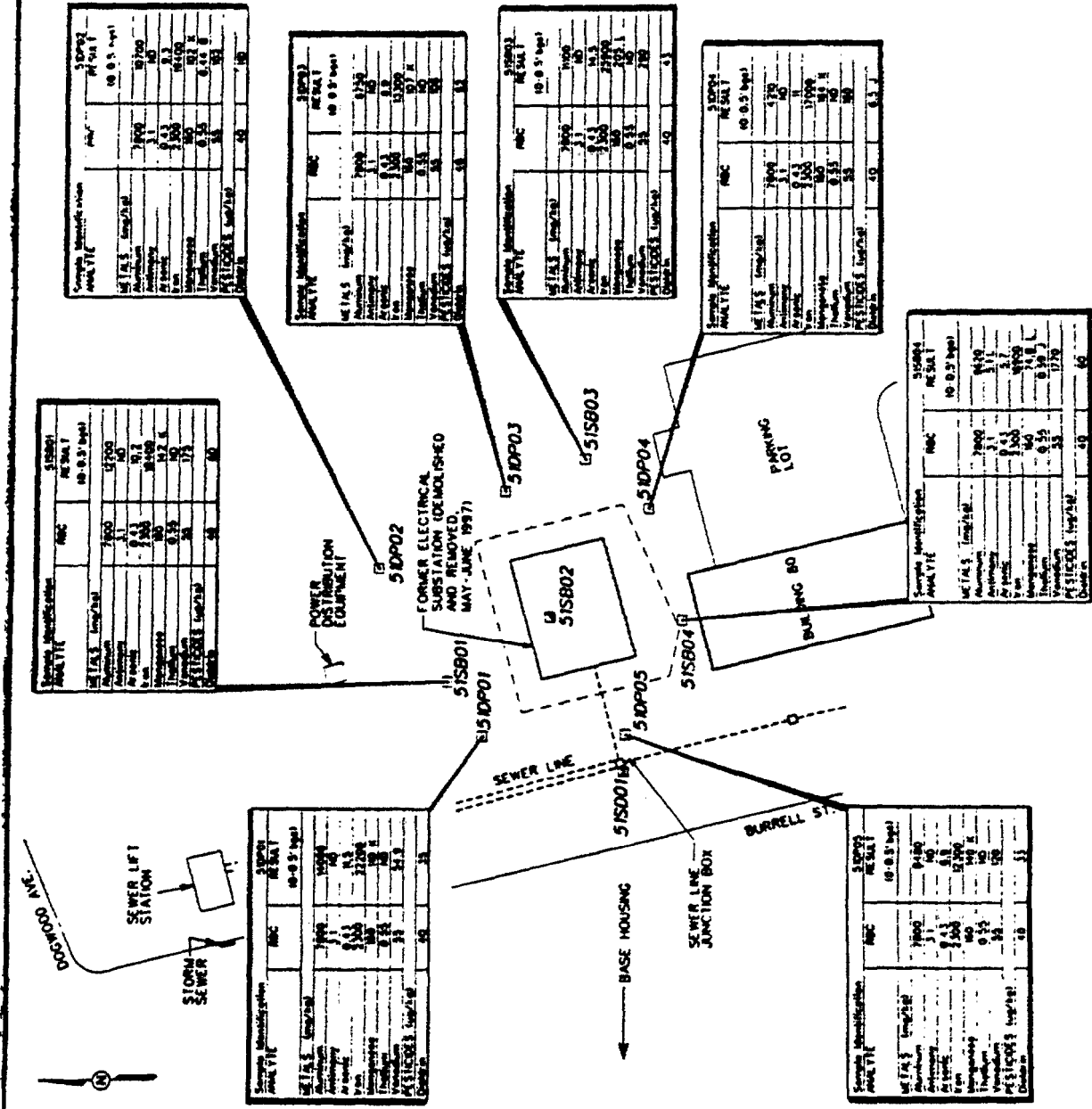
- 5SDP01 □ SURFACE/SUBSURFACE DIRECT-PUSH SOIL SAMPLE (1997)
- 5ISD01 □ SEWER SEDIMENT SAMPLE (1997)
- 5MW01 ○ SHALLOW MONITORING WELL (1997)
- 5ISB01 ○ SOIL BORING (1997)
- EXCAVATION AREA (INTERIM REMOVAL ACTION, MAY-JUNE 1997)



**FIGURE 3**  
 IRP SITE OT-51  
 FOCUSED RI  
 SAMPLING LOCATIONS

UNITED STATES AIR FORCE  
 LANGLEY AIR FORCE BASE  
 HAMPTON, VIRGINIA





**LEGEND:**

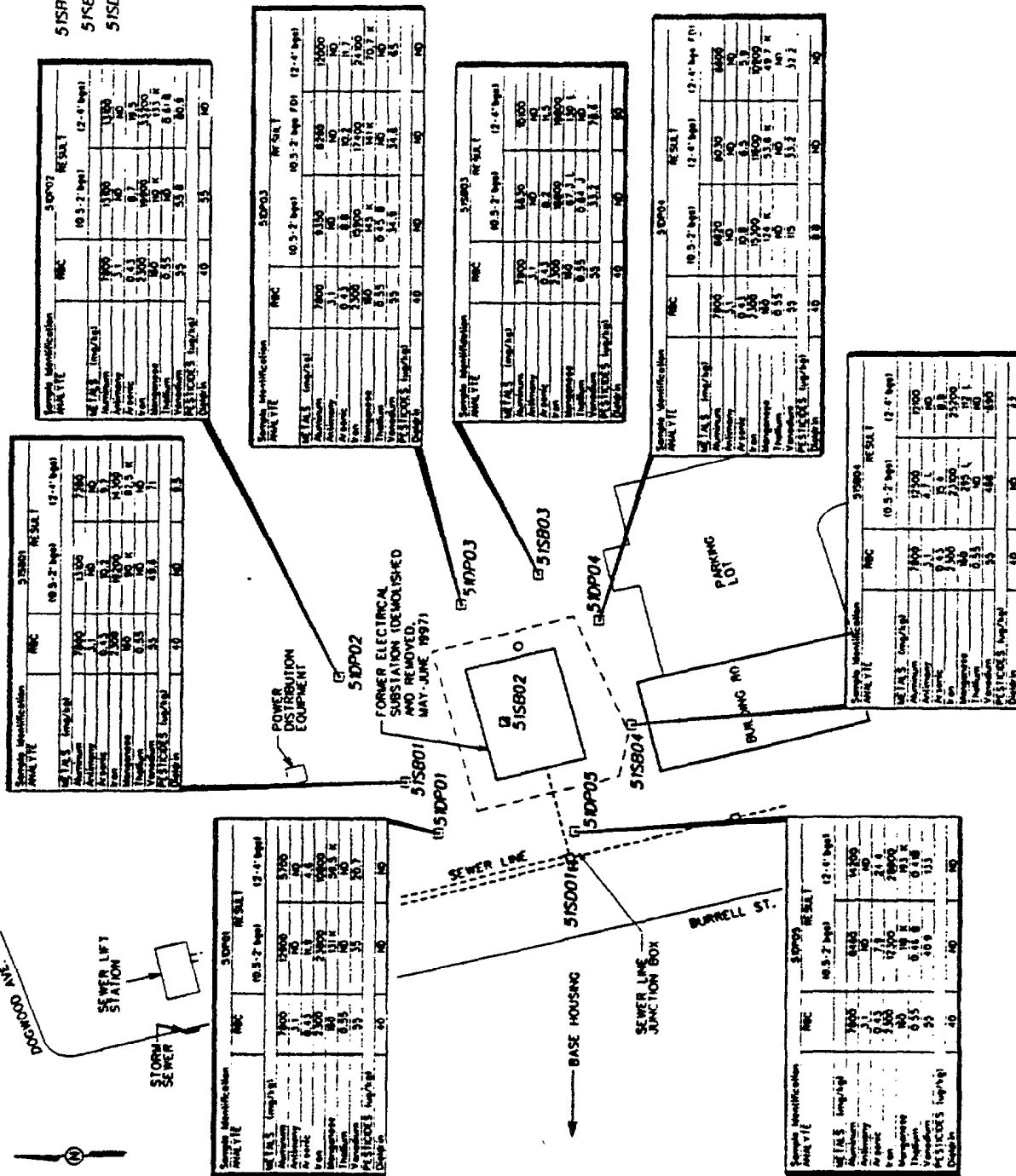
- 51S802 M SOIL BORING LOCATION
- 51S801 (I) SOIL SAMPLE LOCATION
- 51S801 H SEDIMENT SAMPLE LOCATION
- 8 ANALYTE DETECTED IN THE ASSOCIATED BLANK
- 848 BELOW GROUND SURFACE
- FD FIELD DUPLICATE
- J ESTIMATED VALUE GREATER THAN REPORTING LIMIT AND LESS THAN REPORTING LIMIT
- K REPORTED VALUE MAY BE BIASED HIGH; ACTUAL VALUE IS EXPECTED TO BE LOWER
- L REPORTED VALUE MAY BE BIASED LOW; ACTUAL VALUE IS EXPECTED TO BE HIGHER
- mg/kg MILLIGRAMS PER KILOGRAM
- ND NOT DETECTED
- RBC RISK-BASED CONCENTRATION (EPA REGION III, OCTOBER 1997)
- ug/kg MICROGRAMS PER KILOGRAM
- EXCAVATION AREA INTERIM REMOVAL ACTION, MAY-JUNE 1997



**FIGURE 4**  
**IRP SITE 01-51**  
**SURFACE SOIL ANALYTICAL**  
**RESULTS ABOVE SCREENING**  
**LEVELS (DECEMBER 1997)**

UNITED STATES AIR FORCE  
 LANGLEY AIR FORCE BASE  
 HAMPTON, VIRGINIA





**APPENDIX C**  
**Glossary**

**Administrative Record:** A collection of documents containing all the information and reports generated during the entire phase of investigation and cleanup at the site and used to make a decision on the selection of the preferred alternative under CERCLA.

**Carcinogenic Risk:** Cancer risks are expressed as numbers reflecting the increased chance that a person will develop cancer if exposed to chemicals or substances. For example, EPA's acceptable risk range for Superfund sites is  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . This means that the probability of cancer should not be greater than 1 in 10,000 chance to a 1 in 1,000,000 chance above background.

**Comprehensive Environmental Response, Compensation and Liability Act (CERCLA):** A federal law, commonly referred to as the Superfund Program, passed in 1980 that provides for the cleanup and emergency response in connection with numerous existing inactive hazardous waste disposal sites that endanger public health and safety of the environment.

**Chemicals of Potential Concern (COPC):** Chemicals, either present at the site as a result of historical activities or of likely concern to human health and the environment, which are evaluated in the risk assessment.

**Ecological Risk Assessment:** An evaluation of the risk posed to the environment if remedial activities are not performed at the site.

**Exposure Pathways:** Describes the course a chemical or physical agent takes from the source to the exposed individual. Elements of the exposure pathway are: (1) the source of the released chemical; (2) the contaminated medium (e.g., soil); (3) a point of contact with the contaminated medium; and (4) an exposure route (e.g., ingestion, inhalation) at a contact point.

**Hazard Index (HI):** A number indicative of noncarcinogenic health effects which is the ratio of the existing level of exposure to an acceptable level of exposure. A value equal to or less than one indicates that the human population is not likely to experience adverse effects.

**Human Health Risk Assessment:** An evaluation of the risk posed to human health should remedial activities not be implemented.

**Installation Restoration Program (IRP):** Program established by the United States Air Force to systematically identify and remediate contaminated sites. The IRP was designed to be consistent with EPA rules and guidelines.

**Operable Unit (OU):** A discrete portion of a site or a discrete action representing an incremental step in the investigation and remediation of hazardous substances at a facility.

**Proposed Plan:** A document that presents a proposed cleanup alternative and requests public input regarding the proposed alternative.

**Record of Decision (ROD):** A legal document that describes the cleanup action or remedy selected for a site, the basis for the choice of that remedy, and public comment on alternative remedies.

**Remedial Action:** Implementation of plans and specifications, developed as part of the design, to remediate a site.

**Remedial Investigation (RI):** Part of a study of a facility that supports the selection of a remedy for a site

where hazardous substances have been disposed. The RI identifies the nature and extent of contamination at the facility.

**Site:** The facility and any other areas in close proximity to the facility where a hazardous substance, hazardous waste, hazardous constituent, pollutant, or contaminant from the facility has been deposited, stored, disposed of, or placed or has migrated or otherwise come to be located.

**Site Inspection (SI):** The SI determines if the site presents an immediate threat that requires prompt response action because the site may pose a threat to human health and/or the environment.

**Site-Related Risk:** Cancer and non-cancer risk estimates that are based on contaminants present in environmental media due to site-specific human activities at Langley AFB, but that exclude the contribution of background contaminant concentrations.